DOCUMENT RESUME

ED 127 318 SP 010 355

AUTHOR Garcia, Ricardo A.; Denton, Jon J.
TITLE Decision Models for Admission into Teacher Preparation: An Application of Regression Analysis.
NOTE 19p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Achievement; Evaluation; *Models; *Predictor Variables; Student Teacher Relationship; *Student Teachers; *Success Factors; Teacher Attitudes; *Teacher Behavior; Teacher Characteristics; Teacher Education; Teacher Selection

ABSTRACT

This investigation explores the feasibility of constructing regression models for predicting teaching success and classroom behavior utilizing various measures of attitudes, personality, and psychological factors as predictors. The purpose of the study is to devise decision models that predict a candidate's success in student teaching as determined by supervisory ratings and to predict the candidate's ability to demonstrate appropriate teaching behaviors as measured by an observation check sheet during student teaching. The criterion variables (achievement data and observation data) and predictor variables (attitude scales, personality scales, and psychological health measures) were collected from 53 student teachers randomly selected from 120 teaching candidates admitted into a secondary level student teaching program. Regression analysis reveals that teaching behavior, but not teaching success, is independent of attitude and personality factors. The regression for the teaching success model suggests a set of predictors for student teaching success. (Author/JMF)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED127318

Decision Models for Admission into Teacher Preparation: An Application of Regression Analysis

Ricardo A. Garcia
East Texas State University

Jon J. Denton
Texas A&M University

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Running Head: Decision Models

SP010 355

With the present surplus of teachers in most teaching fields and geographical regions of the country (Graybeal, 1974), it has become increasingly important to be more selective in the acceptance of individuals into teacher education. The question becomes one of determining the individual's potential for success in teaching. Not all teacher candidates have the desire nor the personality traits which will enable them to profit from teacher preparatory programs. Since a college or university often offers a specific and unique set of learning experiences, it becomes that institution's responsibility to identify those students who are able to profit from its teacher preparation program. By the same token, those students who are found to be unlikely to attain the competencies necessary for effective teaching should be identified early and guided into other careers.

The issue becomes one of devising a system to produce a program admission decision model based on the specific type of teacher preparation employed by the institution. The model should assist with decisions concerning career counseling and selection of students into the program. The usefulness of such a model is determined by the extent to which it represents reality. If it is intended to predict eventual success in student teaching, it must account for the variance inherent in the criterion used to determine success. If the model can account for at least a moderate amount of this variance, it may be useful in identifying those teacher candidates in need of special counseling and assistance. If, on the other hand, the model accounts for a high percentage of the variance, it may be used for program evaluation and perhaps as a selection device for admission into the teacher education program.

Nearly 25 years ago it was suggested that efforts in the direction of prediction of attitudes and behaviors through the use of psychometric devices might be fruitful in teacher education research. An investigation conducted

by Hedlund (1963) was concerned with identifying student characteristics at the time of admission to an undergraduate teacher preparation program and relating these attributes to success in that program as well as to effectiveness in secondary school teaching. He was able to construct a "prediction index" containing the 18 best predictors for each sex. When this index was applied to the validating groups, he was able to reject nearly two-thirds of the least effective teachers with a small loss of teachers of greater effectiveness. Other efforts with personality scales and attitude scales have produced encouraging results in terms of predicting eventual successful student teaching experiences (Gough and Pemberton, 1952; Shaw, Klausmeir, Luker, and Reid, 1952; Downie and Bell, 1953; Gowan and Gowan, 1955; Moore and Cole, 1957; Fishman, 1957; Garvey, 1970; Leeds, 1972).

PURPOSE

The intent of this investigation was to develop a decision model based on personality and attitude measures of aspiring teachers as predictor variables for successful completion of a teacher preparation program.

It was hypothesized that a large percentage of the variance inherent in demonstrating appropriate teaching behavior and completing a successful student teaching experience is due to certain teacher attitudes and personality traits. It was further assumed that achievement of terminal performance objectives in student teaching is related to teacher effectiveness, i.e., effective student teachers rate high on measures of performance and measures of appropriate classroom practices. If both of these assumptions are accurate, the decision models produced by this investigation can accurately predict student teaching success as determined by the achievement of terminal performance objectives and the demonstration of appropriate classroom practices.

METHOD

The samples for this investigation consisted of 55 individuals randomly selected from the 120 secondary student teachers for the 1974-75 academic year at a land grant university accredited by the National Council for the Accreditation of Teacher Education and by the Southern Association of Colleges and Universities. In order to qualify for student teaching each student must have: (1) completed 95 semester hours, that is, achieved senior classification; (2) completed a minimum of 18 semester hours in a teaching field with a minimum grade point average of 2.25 on a 4 point scale; and, (3) achieved a satisfactory score on a standardized English Proficiency Examination. In addition, teacher candidates must complete a minimum of 18 hours of professional education course-work including educational psychology, general teaching methods, secondary curriculum, microteaching, and student teaching for certification.

The instruments used in this investigation were: the Minnesota Teacher Attitude Inventory (Cook, Leeds and Callis, 1951); the Rokeach Dogmatism Scale Form E (Rockeach, 1960); the California Psychological Inventory (CPI) (Gough, 1967); the Tennessee Self Concept Scale (TSCS) (Fitts, 1965); Student Teacher Formal Evaluation Form (E.D.C.I. Student Teaching Handbook, 1974); and the Del Popolo Observation Check Sheet for Student Teachers (Del Popolo, 1960).

All 18 subscales of the CPI were used in this investigation and 16 of the 28 subscales of the TSCS were used. The 16 TSCS subscales utilized were: self criticism, total Positive score, identity, behavior, physical self, moral ethical self, personal self, family self, social self, total conflict, psychosis, neurosis, number of deviant signs, personality disorders, general maladjustment, and personality integration.

Several investigators have reported the MTAI to be unstable and a poor predictor of success for pre-service teachers (Day, 1959; Rabinowitz and Rosenbaum, 1960; Yee and Fruchter, 1971; and Campbell, 1973). One of the authors of the MTAI, C. H. Leeds, concluded after an investigation that the MTAI can be used with preservice teachers providing a modified scoring key is used (Leeds, 1972). He found correlations as low as .27 between scores on the MTAI using the original key and evaluations by principals, pupils and outside observers. The modified key produced correlations as high as .55. The primary difference between the original and modified answer keys rests with the reduction of the test length by approximately 25%. Although this modified key has not appeared frequently in research reports, it was made available to us. Thus, the MTAI scores reported in this investigation were computed using the modified key.

The Del Popolo Observation Check Sheet consists of 75 items related to the classroom behavioral traits of teachers. For the purpose of this investigation, the instrument was reduced by 10 items; these items were judged inappropriate by the university supervisors of student teachers. The complete instrument has a reported reliability of .96 and correlations of between .47 and .41 with the MTAI. Other reliability values reported for the various instruments used are: .68 to .85 for the Rokeach scales and a range from .88 to .93 for the MTAI scales. Reliabilities on the CPI for the various subscales range from a low of .38 for communality to a high of .87 for tolerance, while reliabilities of the various subscales of the TSCS range from .60 to .92.

The Student Teacher Formal Evaluation form denotes the behavioral component of all performance objectives to be attained during the student teaching experience. A five-point scale associated with each item enables the

supervisors of the student teacher to rate subjectively the candidate's performance on each teaching skill or characteristic. Reliability values do not exist for this instrument, but content validity has been assessed by departmental faculty and university supervisors who have evaluated the congruence of this form with the performance objectives for student teaching and found it to be satisfactory.

Procedure

A battery of tests was administered to all secondary teaching candidates at the beginning of their student teaching experiences each semester. This battery consisted of the MTAI, the Rokeach Dogmatism Scale, the CPI, and the TSCS. No attempt was made to interpret or place any evaluative significance on the psychological or personality profiles of the subjects. The CPI and TSCS were used only to quantify certain personal traits that may be related to teaching success.

The corresponding treatment of this investigation was the student teaching program conducted by the department of educational curriculum and instruction. Each student teacher had approximately 200 hours of organized class contact to demonstrate proficiency of the stated performance objectives enumerated in the Student Teacher Formal Evaluation form. At the completion of the treatment the Student Teacher Formal Evaluation form and the Del Popolo Observation Check Sheet were completed on each candidate by his university supervisor.

Reduction of the Regressor Variables

Because data relevant to the 18 subscales of the CPI and 16 subscales of the TCS were collected, over thirty predictors from the 4 instruments used in this investigation were possible. In addition, correlation analysis indicated that much of the information contained in the various subscales of the CPI and TSCS measured the same traits. This situation results in collinearity

among the predictors if each variable is used in a regression equation. In order to reduce the number of predictors and deal primarily with orthogonal factors, the CPI and TSCS were factor analyzed (Veldman, 1967) for each trial and for the combined trials.

In order to determine the stability of these factors from trial to trial and from trial to combined data, the rotated factor matrices were compared. The correlations are presented in Table 1. An examination of Table 1 reveals that the factors extracted for the CPI and TSCS are highly stable with only a few exceptions (e.g. the social self and total conflict subscales).

---

insert Table 1

Predictor scores were determined by combining subscales according to their greatest factor loading to produce a weighted average for these subscales. Since the factor loading is actually a correlation of the variable with the factor, the weights chosen were the squares of the factor loadings. Each maximum factor loading was multiplied by 10, rounded to 2 digits and squared to produce the factor weight. The final predictor was the weighted average of the factors. This method retains more of the information in each variable than would be the case if the variables within a factor were averaged or if only one of the variables were chosen to represent the factor. Table 2 presents the factors for the CPI and TSCS and their associated weights.

The 9 factors used to develop prediction equations for teaching behavior and teaching success were the following: the MTAI score, the Rokeach Dogmatism Scale score, the 4 factors of the CPI and the 3 factors of the TSCS. The criterion variable for appropriate teaching behavior was the Del Popolo Classroom Observation Check Sheet score. The criterion for teaching success was

the Formal Evaluation Form score. The univariate descriptive statistics for the 9 predictors and the two criterion variables are presented in Table 3.

---

insert Table 2

---

insert Table 3

RESULTS

Appropriate Classroom Behavior

The data for the 9 predictors were subjected to a stepwise analysis (Barr, Goodnight; 1972) using the Del Popolo Observation Check Sheet as the criterion variable. The "best" model produced by this analysis was a one predictor model with CPI factor 1 as the regressor. This model yielded a multiple R^2 of .042. This was not sufficient so the maximum R^2 improvement procedure (Barr, Goodnight; 1972) was utilized to determine if a better model could be found. The "best" model obtained from this procedure was an equation consisting of all 9 variables. However, this model produced a multiple R^2 of .093. Subsequent analysis was not attempted since the variance of the criterion variable accounted for by the predictor variables was so small.

Teaching Success

Stepwise regression (Barr, Goodnight; 1972) was also used to determine the best predictors for teaching success. The model produced was a 4 regressor equation using CPI factors 2 and 3 and TSCS factors 1 and 2. This model had a multiple R^2 of .346. Maximum R^2 improvement (Barr, Goodnight; 1972)

was used to determine if a model which accounted for more variance could be found. The best model determined using this procedure was a 9 predictor equation with a multiple R^2 of .389. This model was used for the construction of the following prediction equation.

$$y = .44.800 - .052x_1 - .030x_2 - .250x_3 + .821x_4$$

$$+ 705x_5 - .007x_6 - .210x_7 + .487x_8 - .104x_9$$

Table 4 reports the analysis of variance, regression coefficients, and statistics of fit for this model.

Inspection of Table 4 reveals the 9 personality and attitude factors regress significantly on the teaching success variable. The regression is significant at $p<.01$. Of the 9 factors, 4 contribute significantly to regression at $p<.01$. Factor x_7 (TSCS factor 1) produced a significant sequential sums of squares but a nonsignificant partial sums of squares. This inconsistency suggests the variance this factor accounts for is also accounted for by one or more of the other variables. The residuals for this model varied only ± 10 from the actual criterion values.

---

insert Table 4

SUMMARY

This investigation explored the feasibility of constructing regression models for predicting teaching success and classroom behavior utilizing various measures of attitudes, personality and psychological factors as predictors. The large number of possible predictors and the high correlation among them necessitated the employment of factor analysis not only to reduce

the number of regressors but also to increase orthogonality among them.

The various predictors did not produce a significant regression for appropriate teaching behavior as measured by the Del Popolo Observation Check Sheet. The predictors consisting of the various measures of attitudes, personality and psychological variables were only able to account for 9.2% of the variance inherent in this measure of teaching behavior.

The criterion for teaching success in this investigation was the achievement of specific terminal performance objectives. Nine variables produced a statistically significant prediction model ($p<.01$). The regression accounted for approximately 39% of the variance associated with the criterion variable. Statistically significant contributions were made by CPI factor 2 ($p<.01$), CPI factor 3 ($p<.01$), and TSCS factor 2 ($p<.01$). Both CPI factors 2 and 3 deal with interpersonal characteristics which are essential elements of the teaching function. Factor 2 of the TSCS is the dimension measured by the self criticism subscale. It is not surprising that achievement of the terminal performance objectives is related to the interpersonal characteristics and self-criticism dimensions since the performance objectives in student teaching are concerned primarily with communication skills, i.e., questioning, large and small group activities, reinforcement and presentation skills, and, to a lesser degree the ability of self analysis and criticism.

This prediction equation is able to predict achievement of terminal performance objectives within a ± 10 point range. This range was determined from the residuals produced for the 55 subjects in the sample. The minimum score possible was 0 while the maximum score was 60 on the Formal Evaluation Form.

Equations for the prediction of student teaching success appear infrequently in the research literature. Decision structures based on prediction equations occur even more infrequently. The regression equation produced by

this investigation cannot stand alone as the sole criterion in a decision structure for performance based teaching programs since regression coefficients are not stable from population to population or from situation to situation. This model does demonstrate, however, that attitude and personality factors do account for a substantial amount of the variance inherent in the achievement of terminal performance objectives. Together with other factors (e.g. variables associated with pre-student teaching field experiences), this approach may well produce a functional decision structure for course evaluation as well as possible screening purposes for admission into teacher preparation program.

References

Barr, A. J., and Goodnight, J. H. Statistical Analysis System. Department of Statistics. Raleigh, North Carolina: North Carolina State University, 1972.

Campbell, D. E. Relationship between attitudes and characteristics of student teachers, 1973. (ERIC Document Reproduction Service No. ED 077 922).

Cook, W. W., Leeds, C. H., and Callis, R. Minnesota Teacher Attitude Inventory (form A). New York, The Psychological Corporation, 1951.

Day, H. P. Attitude changes of beginning teachers after initial teaching experience. Journal of Teacher Education, 1959, 10, 326-328.

Del Popolo, J. A. Authoritarian trends in personality as related to attitudinal and behavioral traits of student teachers. Journal of Educational Research, 1960, 53, 252-257.

Downie, N. M. and Bell, C. R. The Minnesota Teacher Attitude Inventory as an aid in the selection of teachers. Journal of Educational Research, 1953, 46, 699-704.

EDOI Student teaching handbook, College Station, Tx: Texas A&M University, 1974.

Fishman, J. A. The MTAI in an American minority-group setting. Differences between test characteristics for norm and non-norm populations. Journal of Educational Psychology, 1957, 48, 41-51.

Fitts, W. H. Tennessee Self Concept Scale, Nashville, Tennessee: Counselor Recordings and Tests, 1965.

Garvey, R. Self-concept and success in student teaching. Journal of Teacher Education, 1970, 21, 357-361.

Gough, H. G. California Psychological Inventory. Palo Alto, California: Consulting Psychologists Press, Inc., 1967.

Gough, H. G., and Pemberton, W. H. Personality characteristics related to success in practice teaching. Journal of Applied Psychology. 1952, 36, 207-311.

Gowan, J. C. and Gowan, M. S. A teacher prognosis scale for the MMPI. Journal of Educational Research.

Graybeal, W. S. Status and trends in public school teacher supply and demand. Journal of Teacher Education, 1974, 25, 200-209.

Hedlund, P. A. Cooperative study to predict effectiveness in secondary school teaching. Journal of Teacher Education, 1953, 4, 230-234.

Leeds, C. H. The prediction validity of the Minnesota Teacher Attitude Inventory. Final Report, Greenville, South Carolina: Furman University, 1972. (ERIC Document Reproduction Service No. ED 072 111).

Moore, C. H. and Cole, D. The relation of MMPI scores to practice teaching ratings. Journal of Educational Research, 1957, 50, 711-716.

Rabinowitz, W. and Rosenbaum, I. Teaching experience and teacher's attitudes. Elementary School Journal, 1960, 60, 313-319.

Rokeach, M. The open and closed mind. New York: Basic Books, Inc., 1960.

Shaw, J. K., Klausmeir, H. S., Luker, A. H., and Reid, H. T. Changes occurring in teacher pupil attitudes during a two weeks guidance workshop. Journal of Applied Psychology, 1952, 36, 304-306.

Veldman, D. J. Fortran programming for the behavioral sciences. New York: Holt, 1967.

Yee, A. H. and Fruchter, B. Factor content of the Minnesota Teacher Attutude Inventory. American Educational Research Journal, 1971, 8, 119-133.

Table 1

Correlation Between Factor Loadings for the Two Trials for the CPI and TSCS

Comparison	Subscales																	
CPI Rotated Factor Loading Matrices																		
	Do	Cs	Sy	Sp	Sa	Wb	Re	So	Sc	To	Gi	Cm	Ac	Ai	Ie	Py	Fx	Fe
Fall Trial: Spring Trial	.93	.92	.86	.64	.89	.92	.59	.72	.91	.72	.97	.91	.89	.92	.97	.74	.91	.84
Fall Trial: Combined Data	1.00	.97	.98	.74	.91	.90	.95	.99	.98	.96	.97	.99	.93	.91	.99	.95	.96	.82
Spring Trial: Combined Data	.93	.97	.93	.99	.97	1.00	.77	.69	.96	.87	.93	.94	.98	.91	.99	.92	.96	.72
TSCS Rotated Factor Loading Matrices																		
	SC	TPS	IDT	BE	PS	MES	PES	FS	SS	TC	PSY	NEU	NDS	PED	GM	PEI		
Fall Trial: Spring Trial	.62	1.00	.92	.97	.60	1.00	.84	.94	.43	.16	.94	.90	.71	.97	.93	.79		
Fall Trial: Combined Data	.82	.97	.88	1.00	.81	.98	.88	.92	.84	.11	.95	.95	.66	.99	.92	.71		
Spring Trial: Combined Data	.96	1.00	1.00	.98	.95	.96	.95	.98	.84	.99	.84	.98	1.00	.98	.99	.73		

CPI subscale notations: Dominance (Do), Capacity for Status (Cs), Sociability (So), Social Presence (Sp), Self-acceptance (Sa), Sense of Well-being (Wb), Responsibility (Re), Socialization (So), Self-control (Sc), Tolerance (To), Good Impression (Gi), Communality (Cm), Achievement via Conformance (Ac), Achievement via Independence(Ai), Intellectual Efficiency (Ie), Psychological-mindedness (Py), Flexibility (Fx), Femininity (Fe).

TSCS subscale notations: Self-criticism (SC), Total Positive Score (TPS), Identity (IDT), Behavior (BE), Physical Self (PS), Moral Ethical Self (MES), Personal Self (PES), Family Self (FS), Social Self (SS), Total Conflict (TC), Psychosis (PSY), Neurosis (NEU), Number of Deviant Signs (NDS), Personality Disorders (PED), General Maladjustment (GM), Personality Integration (PEI).

Table 2

Components and Weights of the CPI and TSCS Factors

Factor	Component Variables/Weights						
	California Psychological Inventory						
1	Cs/28	Sp/49	Wb/47	Ai/59	Ie/39	Py/53	Fx/60
2	Re/53	So/19	Sc/77	To/44	Gi/56	Ac/45	Fe/17
3	Do/68	Sy/63	Sa/56				
4	Co/1						
	Tennessee Self Concept Scale						
1	TPS/83	BE/79	PS/45	MES/71	PES/50	FS/50	
	SS/33	NEU/55	PEB/79	GM/59	PEI/9		
2	SC/1						
3	IDT/1						

Table 3

Univariate Descriptive Statistics for the Criterion and Predictor Variables

Variable	m[a]	SD	Low Score	High Score
Formal Evaluation Form	49.71	6.49	34.00	60.00
Del Popolo Checksheet	253.20	40.96	136.00	324.00
MTAI Scale	23.91	17.79	-12.00	61.00
Rokeach Scale	143.55	30.58	-41.00	87.00
CPI Factor 1	23.13	3.44	16.42	30.50
CPI Factor 2	25.43	4.04	15.21	33.91
CPI Factor 3	26.39	3.96	17.83	33.65
CPI Factor 4	26.38	2.27	17.00	28.00
TSCS Factor 1	115.65	11.98	77.87	134.04
TSCS Factor 2	35.24	6.50	12.00	49.00
TSCS Factor 3	129.15	40.96	136.00	324.00

Note: [a] n = 55.

Table 4

Analysis of Variance, Regression Coefficients and Statistics of Fit for the Teaching Success Prediction Model

Source	df	SS	MS	F	p	R^2
Regression	9	882.4841	98.0538	3.1770	.0049	.389
Error	45	1388.8614	30.8636			
Total	54	2271.3455				

Source	df	Sequential SS	F	p	Partial SS	F	p
x_1	1	125.9890	4.0821	.049	57.3822	1.860	.180
x_2	1	8.6561	.2805	.599	8.0978	.262	.611
x_3	1	.0650	.0021	.964	14.2409	.461	.500
x_4	1	.0604	.0020	.965	260.5133	8.440	.006
x_5	1	238.9704	7.7428	.007	292.570	9.480	.004
x_6	1	2.8099	.0910	.764	0.0132	0.000	.983
x_7	1	203.8237	6.6040	.013	110.5812	3.583	.065
x_8	1	281.6674	9.1262	.004	275.6836	8.932	.005
x_9	1	20.4420	.6623	.420	20.4420	.6623	.420

Source	b weights	t	p
Intercept	44.8008	3.1270	.003
x_1	- .0517	-1.3635	.180
x_2	- .0296	- .5122	.611
x_3	- .2498	.6793	.600
x_4	.8208	2.9053	.006
x_5	.7052	3.0789	.004
x_6	- .0078	- .0207	.9835
x_7	- .2096	-1.8929	.065
x_8	.4874	2.9887	.005
x_9	- .1038	- .8134	.420

x_1 = MTAI score, x_2 = Rokeach score, x_3 = CPI factor 1 score, x_4 = CPI factor 2 score, x_5 = CPI factor 3 score, x_6 = CPI factor 4 score, x_7 = TSCS factor 1 score, x_8 = TSCS factor 2 score, x_9 = TSCS factor 3 score.